



Rancher Streamlines k3s Development Using Amazon Web Services (AWS) and Arm

Case Study

Company snapshot

Name: **Rancher**

Vertical: **Open Source Software**

size: **150+ employees**

HQ: **San Francisco, USA**

Founded: **2014**

Goal

Increase developer productivity and reliability of k3s releases for the Arm architecture.

Solution

Establish a native Arm architecture developer workflow in a cost-efficient manner by using Amazon EC2 A1 instances powered by AWS Graviton Processors featuring 64-bit Arm Neoverse cores and custom silicon designed by AWS.

Benefits

- ✦ Increased developer productivity
- ✦ CI pipeline runs natively on Arm architecture as it:
 - Eliminates cross-compilation and the associated risks of mixing different architecture types
 - Increases testing throughput and reliability by eliminating the need for emulation
- ✦ Reduced infrastructure costs

Accelerate Software Development for IoT

With the convergence of IT and Operations Technology (OT) in many organizations, containers are making the leap from enterprise systems to IoT. As Kubernetes has become the de-facto standard container orchestration framework for cloud-native deployments, customers are leveraging Kubernetes to address many of the complex challenges that development teams see when building and deploying IoT solutions, such as:

Enabling DevOps for IoT

Providing a unified deployment model that allows DevOps teams to quickly and automatically test and deploy new services with support for zero-downtime deployments in the form of rolling updates, which is important for mission-critical IoT solutions.

Scalability

Delivering the ability to handle thousands to millions of device connections, sending terabytes of data and performing real-time analytics using a deployment infrastructure that can scale to meet the needs.



“By leveraging the Amazon A1 instances, Arm software development no longer required cross-compilation.”

High Availability

Providing high available services and architecture to run workloads independently that can be restarted or recreated without any negative effect to end-users.

At a first glance, Kubernetes may appear too large and complex for Edge and IoT devices which typically have smaller resource footprints than in the data center or cloud. To resolve this issue, Rancher has developed a popular open source project called k3s. k3s is a lightweight, easy to install Kubernetes distribution geared toward resource-constrained environments and low touch operations. [k3s](#) is particularly useful for edge and IoT environments where the Arm architecture is prevalent today given stringent power efficiency requirements and the Arm IP licensing model that enables a diverse set of solutions.

[Rancher Labs](#) builds innovative, open source software for enterprises leveraging containers and Kubernetes to accelerate software development and improve IT operations. The flagship Rancher container management platform allows users to easily manage all aspects of running Kubernetes in production, on any infrastructure.

For the “things” within IoT, the majority of devices are based on the Arm architecture. These devices are increasingly connected to the network and providing valuable data that can be analyzed at various edge and cloud locations based on cost, network bandwidth and latency sensitivity requirements. In addition, there is a large embedded gateway ecosystem powered by Arm based SoC’s that are adopting container technologies to meet the scalability and security requirements necessary to manage these devices efficiently. For IoT developers, containers provide benefits of abstraction, efficiency, scale and automation.

k3s as a project supports both Arm and x86 as first class citizens and good software engineering practices require a continuous integration (CI) infrastructure. k3s is well suited to continuous integration systems where there’s a requirement to minimize the speed of cluster setup and tear down to exercise the CI task.

Traditionally, Arm development is done using cross-compilers and emulators. However, cross-compilers are tricky to setup. If not done carefully, binaries for different architectures could get mixed up, resulting in broken builds. In addition, reliability aspects need to be considered during debugging of issues using an emulator as it adds an additional software component in the mix. Also, running Arm binaries on an emulator is slower than running on a real CPU which leads to longer CI execution time and increased infrastructure spend.



AWS Instances Offer Cost Savings for Arm-based Applications

To address issues of cross compiling, Rancher turned to Amazon Web Services (AWS). [Amazon EC2 A1](#) instances deliver significant cost savings for scale-out and Arm-based applications such as web servers, containerized microservices, caching fleets, distributed environments that are supported by the extensive Arm ecosystem.

A1 instances are the first EC2 instances powered by AWS Graviton Processors that feature 64-bit Arm Neoverse cores and custom silicon designed by AWS. These instances appeal to developers, enthusiasts, and educators across the Arm developer community. Most architecture-agnostic applications that can run on Arm cores also benefit from A1 instances.

By leveraging the Amazon A1 instances, Arm software development no longer requires cross-compilation. The entire CI pipeline can run natively on Arm architecture, thereby improving reliability by eliminating the risk of mixing different architecture types by mistake. Build and test throughput is increased by running workloads directly on A1 instances which is much faster than running on emulators.

Run Faster Workloads and Reduce Costs

The A1 instances enabled Rancher Labs to build an Arm-native CI pipeline for k3s that improves developer productivity, increases reliability and lowers the overall development and test infrastructure spend.

“When we introduced [k3s](#), a lightweight Kubernetes distribution built for the edge, we needed to run our CI infrastructure on Arm servers,” explains Sheng Liang, Co-Founder and CEO of Rancher Labs. “Amazon EC2 A1 instances made a huge difference in our development and test process, and ensured we could efficiently develop, build and release k3s entirely on Arm architecture without the need for cross-compiling and emulation.”

See these related links for more information:

- + [Arm Infrastructure Developer Community](#)
- + [k3s project](#)
- + [Amazon EC2 A1](#)
- + [Rancher](#)

